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REMARKS - General**Introduction**

Claims 1-18 were pending prior to the amendments set forth above. The Office Action of 09/22/2004 rejected claims 1-18 on the basis of double patenting and obviousness. Applicant appreciates the Examiner's review of the application. Applicant has amended claims 1, 2, 3, 5, 7, 9, 11 and 13; restated original claims 6 and 8, cancelled claims 2, 4, 10, 12, 14, 15, 16, 17, and 18 and added new claims 19 and 20. No new subject matter has been added.

In the Specification

Applicant has amended his specification to overcome the objection noted in Paragraph 1 of the Office Action.

In the Claims

By the above amendments, Applicant has rewritten claims to define the invention more particularly and distinctly so as to overcome the rejections and define the invention patentability over the prior art. Applicant respectfully submits that no new subject matter has been added and that the revised claims are fully supported by his specification.

Claim rejections under Obviousness Double Patenting Doctrine

The Office Action rejects Applicant's old claims 1-18 as being unpatentable over claims 1-8 in US Patent 6,698,980 "Rock Stabilizing Apparatus and Method" issued to Mongrain on March 2, 2004 (Ref A) combined with US Patent 5,885,034 "Washer for Use in Mining" issued to Fergusson on March 23, 1999 (Ref B). The Office Action indicates that Applicant's invention is obvious in

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light of Ref A and Ref B in combination, that is, it would have been obvious to a person skilled in the art at the time Applicant's invention was made, to provide a nut body having a convex hemispherical portion and a domed bearing plate as taught by Ref B to support a mine roof.

Brief Description of the Ref A

Ref A seeks to solve a number of known the problems in the mining industry relating to overly complex ground support apparatus, damage of threads upon shearing of shearing pins and dome nuts; loss of shearing pins during transportation of reinforcing member and hazards caused to workers due flying shards of energized metal from shearing pins and dome nuts. Ref A discloses a rock stabilizing apparatus in the form of a rock bolt comprising a tension member (18), a flat bearing plate (106), a square nut (112) and a single shearing element (50). The tension member has a threaded portion (101) upon which the square nut (112) is threaded by way of bore (32) and a ribbed portion (100) adapted to be inserted into drilled hole (16). The tension member includes a bore (40) traversing the diameter of the treaded portion. The nut also includes a bore (38) traversing the diameter of the nut. Bore (38) and bore (40) are of the same diameter and once axially aligned are adapted to receive shearing element (50) so that the nut is temporarily fixed to the tension member in a first temporary position and the nut and tension member and rotate together in order to mix the hardenable adhesion material (102) within the drilled hole (16) into which the tension member is inserted. As the adhesion material cures and hardens the torque necessary to rotate the nut and tension member together increases to the point where the shearing member (50) shears. The nut is then permitted to travel down the threaded portion of the tension member, compress the bearing plate (106) against the face (110) of the rock formation and tension the tension member. The shearing element is novel and inventive over solid shear pins in that it is a hollow member having a compressible diameter and a compressible gap along its length. The shearing element can be compressed for insertion into the axially aligned bores (38) and (40) and then released to exert compressive forces on the walls of the axially aligned bores thereby retaining it in position. Once sheared, the remnants of the shearing element remain in position within the bores (38) and (40) thereby preventing damage to the threads on the tension member and flying object hazards to nearby workers. Furthermore, the shearing element of Ref A remains in place during transportation from the assembly site to the work site.

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Brief Description of the Ref B

Ref B seeks to solve the problem of shear failure of bearing plates when the tensile loads on a rock bolt exceed the shear strength of the bearing plate. Ref B discloses a washer adapted to improve the load bearing characteristics of the bearing plate and provides a visually detectable early warning of impending bearing plate failure. The washer disclosed in Ref B is frustoconical in shape having a flange portion adapted to bear against the bearing plate so that forces between the washer and the bearing plate are more distributed. The flange portion of the washer is adapted to deform or flatten as the load on the tension member increases thereby reducing stress between the washer and the bearing plate as well as providing a visual indicator of a potential over-stress situation.

The major differences between Ref A and Ref B are in respect of the problems that they attempt to solve which are quite different and hence their respective physical structures are quite different. Ref A discloses a rock bolt apparatus comprising a plurality of parts including a shearing element and Ref B discloses a washer but is silent with respect to a shearing element. Ref A does not include an apparatus disclosed by Ref B.

Brief Description of Applicant's Invention

Applicant's invention is an improved rock bolting apparatus. The problem that Applicant's invention attempts to solve is the inconsistency of the torque_{shear} of various rock bolting apparatus which leads to delays and expenses in mining operations. Applicant's application describes the test results of using two popular and known shearing devices called dome nuts and pinched threads. The dome of the dome nut is adapted first hold the nut and tension member together for mixing adhesion materials within a drilled hole and then the dome portion of the nut is adapted to shear away at a torque_{shear} permitting the nut to advance to the rock face, compress against a bearing plate and tension the reinforcing member. The pinched threads act to "jam" the nut into position until so that the nut and reinforcing member rotate as one and then when the torque on the nut is sufficiently high, the nut will rotate through the pinched area and continue its travel along

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the threads of the reinforcing member. As testing results show in Applicant's application, the value of torque_{shear} varies dramatically for a dome nut or pinched thread type shearing device. Testing results, illustrated in Figure 8 of Applicant's application, show how the present invention causes failure at a much more consistent value of torque_{shear}. Applicant's invention has two primary embodiments. The first embodiment comprises a tension member (18) having a threaded portion (22), a domed bearing plate (24) adapted to move freely along the threaded portion of the tension member, a nut (200) having a square portion and a hemispherical portion and a rolled shearing element (400). The hemispherical portion of the nut acts in concert with the domed portion of the bearing plate to permit a ball and cup joint type of rotation between them to adapt to inclined and uneven surfaces. The threaded portion of the reinforcing member and the square portion of the nut have bores (300) and (226) respectively, traversing their respective diameters. The operation of the apparatus is similar to that of Ref A, in that, the bores are axially aligned and the rolled shearing member is inserted to fix the nut to the tension member so that they can be rotated together for mixing. At a torque_{shear} the shearing member fails and the nut proceeds along the threaded portion of the reinforcing member to compress the domed bearing plate against the rock face. In a second embodiment, there is a flat bearing plate (640) and a flange nut (600) adapted for use when the rock face is relatively flat. **The shearing element in the present invention is a rolled steel member and has resulted in significant improvements in the consistency of torque_{shear} over prior art dome nuts and pinch threads.**

Ref A does not disclose all the elements of the present invention, namely, a rolled steel member having the characteristics and advantages described by Applicant. Ref A does not disclose the use of a domed bearing plate, hemispherical nut and rolled steel shearing element in combination to produce the results claimed by Applicant. Ref B does not disclose a shearing element comprising a rolled steel member. Hence, combined Ref A and Ref B do not disclose all of the elements of Applicant's invention.

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Standard of Patentability to be Applied for Obviousness

The United States Supreme Court set out the standard of patentability in obviousness objections in the case of *Graham v. John Deere*, 383 U.S. 1, 148 USPQ 149 (1966) as comprising the following four factual inquiries:

- a. Determining the scope and contents of the prior art;
- b. Ascertaining the differences between the prior art and the claims in issue;
- c. Resolving the level of ordinary skill in the pertinent art; and,
- d. Evaluating evidence of secondary considerations.

Basic Considerations Which Apply to Obviousness Rejections

The case of *Hodosh v. Black Drug Co., Inc.*, 786 F.2d 1136, 1143 set out the basic considerations which apply to obviousness rejections:

- a. The claimed invention must be considered as a whole;
- b. The references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination;
- c. The references must be viewed without the benefit of impermissible hindsight afforded by the claimed invention; and,
- d. Reasonable expectation of success is the standard with which obviousness is determined.

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To establish a prima facie case of obviousness, three basic criteria must be met:

- a. There must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art;
- b. There must be a reasonable expectation of success found in the prior art; and,
- c. The prior art references must teach or suggest all the claim limitations.

The Basic Requirements of a *Prima Facie* Case of Obviousness have not been Established

Amended claim 1 is not obvious in light of combined Ref A and Ref B

The Combined Prior Art Does not Suggest the Desirability of the Claimed Invention

The claimed invention in amended claim 1 is directed towards an apparatus for ground support comprising a tension member having a bore transversing its threaded portion and a nut adapted to threadably engage the threaded portion of the tension member. The nut has a square portion with a bore transversing its width and a hemispherical portion. The invention includes, in combination with the nut, a domed bearing plate adapted for use on inclined, even and uneven rock faces and a rolled steel shearing element inserted in the axially aligned bores of the tension member and the nut square portion. In use, this apparatus results in a remarkable consistency of torque_{shear}.

Ref A makes no reference to a shearing element comprising a rolled steel member that is used to overcome the problems described by Applicant. Ref B is silent on the matter of shearing elements.

Ref A and Ref B are directed to a different problems as between themselves, that is, Ref A

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attempts to solve the problem associated with damaged threads and worker safety, and Ref B attempts to solve the problem associated with shear failure of bearing plates. The present invention seeks to solve problems associated with inconsistent torque_{shear}. Therefore, there is nothing in either Ref A or Ref B, that, when combined as suggested by the Office Action, would motivate a person skilled in the art to expend the necessary creative effort to create Applicant's invention capable of producing a consistent torque_{shear}. The combined elements of Ref A and Ref B do not result in the combined elements of either claimed embodiment of Applicant's invention.

Ref A and Ref B are complete references

Each of Ref A and Ref B are complete and functional and adapted to solve the different problems described in each of them. Neither Ref A or Ref B suggest the problem described by Applicant and therefore there is nothing in Ref A or Ref B that would motivate a person skilled in the art to use parts from or substitute parts from either reference to arrive at Applicant's invention.

There is no synergy between Ref A, Ref B and Applicant's Invention

Applicant's invention is greater than the sum of its parts. The use of the novel shearing element in combination with a domed bearing plate and nut having a hemispherical portion has resulted in significantly improved shearing consistency of rock bolts that was heretofore unknown. Ref A and Ref B, when combined, would not yield the same results as Applicant's invention because the combination of the rolled steel shearing element, domed bearing plate and hemispherical nut is not disclosed in either one.

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There is no reasonable expectation of success

Combining Ref A and Ref B would not provide the necessary modifications to the claimed invention to overcome the problems identified in Applicant's patent application. There is no shearing element configurations disclosed in either Ref A or Ref B that would resolve the problems cited by the Applicant with respect to inconsistent shearing torques. Combining Ref B (the washer) and Ref A (the rock bolt) would create a rock bolt that had increased shear strength around its flat bearing plate and an ability to warn the operator of an overstress situation that could fail the bearing plate. However, such a combination would not in any way affect the properties of the shearing element of Ref A. In other words, Ref B has no effect on Ref A and so their combination offers no benefits or improvements to Ref A. Therefore there is no rationale for combining these references as there is no advantage or benefit in doing so. However, Applicant's invention has met with substantial success in the market place. Applicant's specification Figure 18 shows significant sales of the invention. Therefore, Applicant's invention is a solution to a long felt want in the market and an unresolved need for rock bolts that have a consistent shearing torque.

Prior Art does not Teach or Suggest Claim Limitations in Applicant's Application

The present invention teaches the use of at least one shearing element comprising a rolled spring member manufactured from steel and adapted to consistently shear at a predetermined torque_{shear}. This is a stated prior art deficiency in Applicant's application at page 3:

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The shearing torque is inconsistent and may be much higher than anticipated thereby creating problems for the operator who must apply much more torque, often manually, to the nut. This leads to delays in rock anchoring operations and unnecessary expense. Alternatively, the shearing torque may be too low resulting in the hardenable material not properly curing and reducing the strength of the installation.

One stated objective of the Applicant's invention, at page 4, is to:

Provide an improved apparatus for ground support in which the shearing element consistently and predictably shears at a predetermined shearing torque.

Applicant's objective is met by providing a shearing element comprising a rolled steel member as shown in Figures 12 and 13 of Applicant's application.

The improved results of applying Applicant's invention to rock bolting apparatus are clearly illustrated in Figure 8 which compares the present invention to prior art shearing devices.

Applicant submits that this physical distinction between its shearing element comprising a rolled steel member and that disclosed in Ref A is a significant and patentable step forward in the art in that it affords much greater consistency in shearing torque. Ref B does not disclose a shearing element and therefore, combined with Ref A, does not disclose the teachings of the present invention which cannot be said to be obvious in light of the cited prior art.

Only in hindsight and with strained interpretation could Ref A and Ref B be said to combine in a manner so as to lead a person skilled in the art to Applicant's shearing element design. As was stated in Uniroyal, Inc. v. Rudkin-Wiley Corp., 5 USPQ 2d 1434 [CAFC 1988] "where prior art references require selective combination ... to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned

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from the invention itself ... Something in the prior art must suggest the desirability and thus the obviousness of making the combination."

Applicant submits that neither Ref A nor Ref B singly or in combination discloses or suggest a rolled steel shearing member resulting in consistent shearing torque.

Applicant teaches a different invention to solve different problems from Ref A and Ref B

Applicant's invention teaches an improved apparatus for ground support comprising a shearing element comprising a rolled steel member. Applicant's invention seeks to solve problems related to inconsistent shearing torque associated with prior art devices. Ref A seeks to solve a different problem from the present invention which is related to damage caused to the threads of the rock bolt from broken shear pins and occupational safety hazards resulting from energized remnants of shear pins flying towards an operator. Ref B seeks to solve a different problem from Ref A and the present invention, namely, improve load bearing characteristics of bearing plates and provide a visual indication that the load on the bearing plate is approaching a failure load.

Applicant respectfully submits that for all of the above reasons, the Office Action obviousness rejection with respect to Claim 1 should be withdrawn.

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Amended claims dependent upon amended claim 1 are not obvious in light of combined Ref A and Ref B

All claims dependent upon amended claim 1 require the use of the rolled steel shearing member in combination with the domed bearing plate and hemispherical nut. Applicant submits that these dependent claims are not obviousness in light of the combined Ref A and Ref B and the obviousness rejection with respect to these claims should be withdrawn.

New independent claim 19 is not obvious in light of Ref A and Ref B

New independent claim 19 discloses the combined use of a flange nut, a flat bearing plate and the rolled steel shearing member for use when the rock face is substantially flat. The nut disclosed in Ref A is a square nut and the nut disclosed in Ref B is a domed nut. The flange nut possesses physical features, such as a square portion, a flange portion and a circumferentially beveled shoulder not disclosed in either Ref A or Ref B. Furthermore, the flange nut relies upon the rolled steel shearing element having a variable diameter and resulting in a consistent shearing torque. Therefore, Ref A and Ref B when combined do not disclose the elements of Applicant's claim 19 and a person skilled in the art would not be led to Applicant's claim 19 through combined Ref A and Ref B.

New independent claim 20 is not obvious in light of Ref A and Ref B.

New independent claims 20 claims as an improvement the rolled steel shearing member of the present invention. Applicant submits that since Ref A and Ref B do not disclose this element and

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do not address problems related to Applicant's invention, new independent claim 20 is not obvious.

Conclusion

For all the above reasons, Applicant submits that his specification and claims are in proper form, and that the claims submitted herein define patentably over the prior art. Therefore Applicant submits that his application is in condition for allowance, which action he respectfully solicits.

The assistance and helpful suggestions set out by the Office Action are greatly appreciated. Applicant would appreciate a further opportunity, by either telephone conversation or additional written submissions, to satisfy any additional and unanticipated objections by the Examiner prior to the issuance of any Office Action made Final

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Enclosures:

Statement under 37CFR 3.73(b)

Power of Attorney

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